11/4/1985

ANALYTICAL RESULTS FOR RICO-ARGENTINE MINE IN RICO, COLORADO

I. INTRODUCTION

This report was prepared to satisfy the requirements of Technical Directive Document (TDD) R8-8502-09 issued to Ecology and Environment, Inc. Field Investigation Team (E&E FIT) by the Region VIII Environmental Protection Agency (EPA). The report describes analytical data resulting from sample collection at the Rico-Argentine Mine on November 14, 1985. The purpose of this sampling effort was to evaluate the extent of contamination that has occurred as a result of past mining activities at the Rico-Argentine Mine. Sampling focused on possible contamination of surface water.

The Rico-Argentine Mine is located north of Rico, Colorado and is an inactive operation owned by the Anaconda Minerals Company. Initially, the chief metal produced in the Rico District was silver. There was a switch to pyrite for sulfuric acid production during the 1954 uranium boom and a sulfuric acid plant was built. Operations consisted of a mill and tailings pond on Silver Creek and an acid plant, cyanide heap leach, and settling ponds on the Dolores River. There were two discharge points associated with the operation. Discharge point 001 was the discharge from the Blaine Tunnel on Silver Creek. There is no longer discharge from 001 because it is redirected underground to the St. Louis Tunnel where it drains into the St. Louis Settling Pond System on the Dolores River. The outfall of the final pond into the Dolores River is discharge point 002.

In April of 1984, Anaconda Minerals Company put into effect a water treatment operation at the St. Louis Tunnel. The operation consists of neutralization using slaked lime.

The city of Rico receives its drinking water supply from Silver Creek above the major mining impacts. The water is treated through infiltration galleries and chlorinated. The site is discussed further in FIT's Site Visit Report and Sampling Plan (TDD R8-8408-17) and the Sampling Activities Report (TDD R8-8411-02). The site location map is shown in Figure 1.

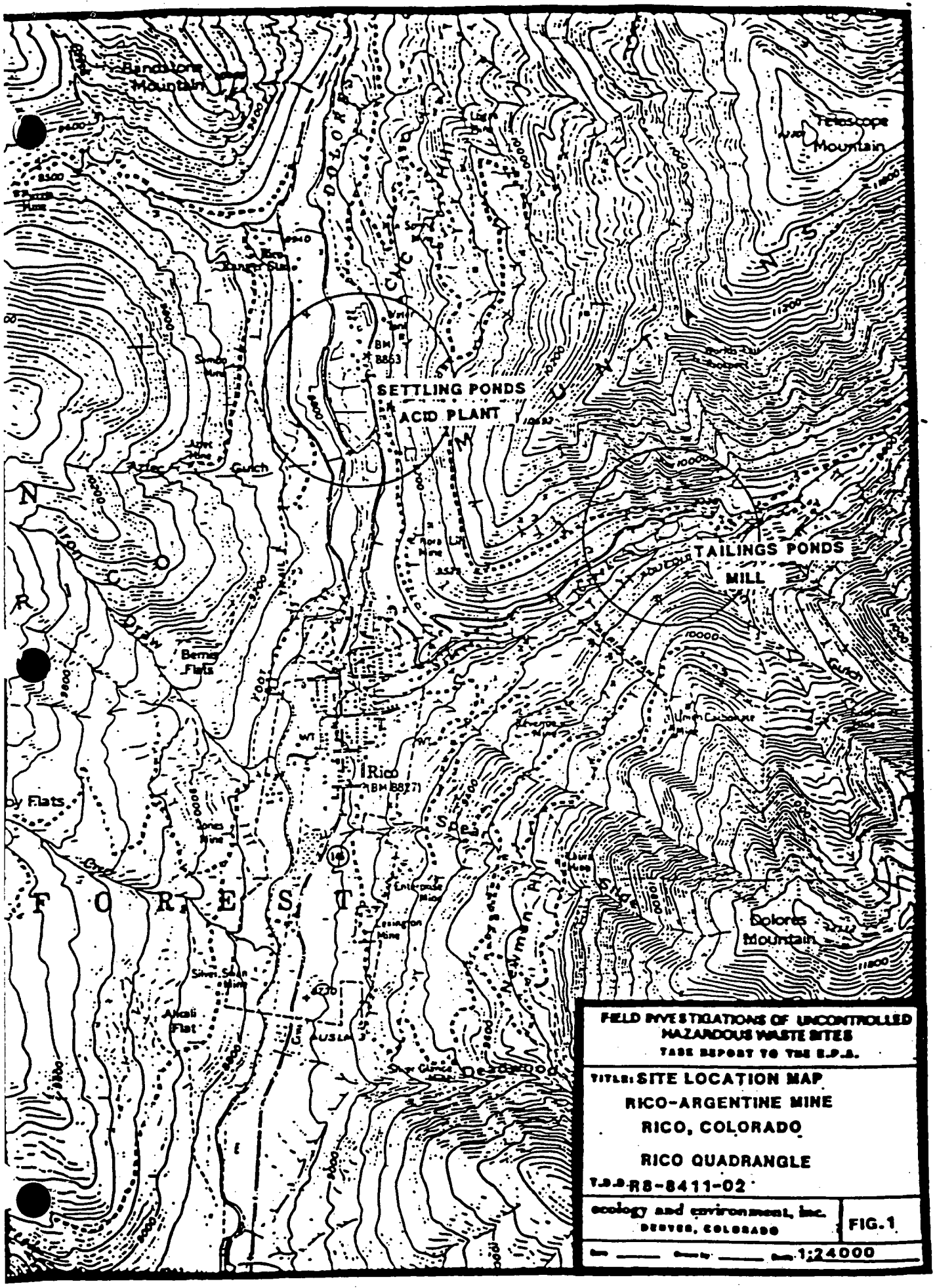
II. QUALITY ASSURANCE REVIEW

All surface water samples were analyzed by Rocky Mountain Analytical Laboratory (RMA) in Arvada, Colorado. The surface water samples were analyzed for cyanide, sulfate and Task 1 and 2 metals including both total and dissolved analyses. The review of methodology and results was performed by John Graves and Lynn Roberts, both of E&E FIT. The inorganic data produced by RMA were found acceptable for use with one qualification. The holding time for cyanide exceeded the contract requirement. The data will be presented but footnoted as per the previous comment.

All sediment samples were analyzed by the Radian Corporation in Austin, Texas. The sediment samples were analyzed for Task 1 and 2 metals. The review of methodology and results was performed by Lynn Roberts, of E&E FIT. The data were found acceptable for use with several qualifications. The holding time for mercury was exceeded by 2 months. The matrix spike recoveries for antimony, selenium, thallium (recoveries were at 0%) and beryllium, nickel, silver and tin were not within the contract required recoveries. Finally, chromium was detected in the blank at 7.0 mg/kg. The data will be presented but footnoted as per the previous comments. See Appendix A for the complete QC Summary Report.

III. ANALYTICAL RESULTS

Analytical results for the Rico-Argentine Mine sampling effort have been tabulated below. The analyses of the total inorganic



FIELD INVESTIGATIONS OF UNCONTROLLED HAZARDOUS WASTE SITES
TASK REPORT TO THE E.P.A.

TITLE: SITE LOCATION MAP
RICO-ARGENTINE MINE
RICO, COLORADO
RICO QUADRANGLE

T.D.# R8-8411-02

ecology and environment, inc.
DENVER, COLORADO

FIG. 1

1:24000

parameters and the dissolved inorganic parameters in surface water are presented in Table 1 and 2, respectively. The analyses of inorganic parameters in sediment are provided in Table 3. Water Quality Standards for the Dolores River and Silver Creek are presented in Tables 4 and 5, respectively. The National Interim Primary and Secondary Drinking Water Standards and Criteria are provided in Table 6. Location of all samples are shown in Figure 2.

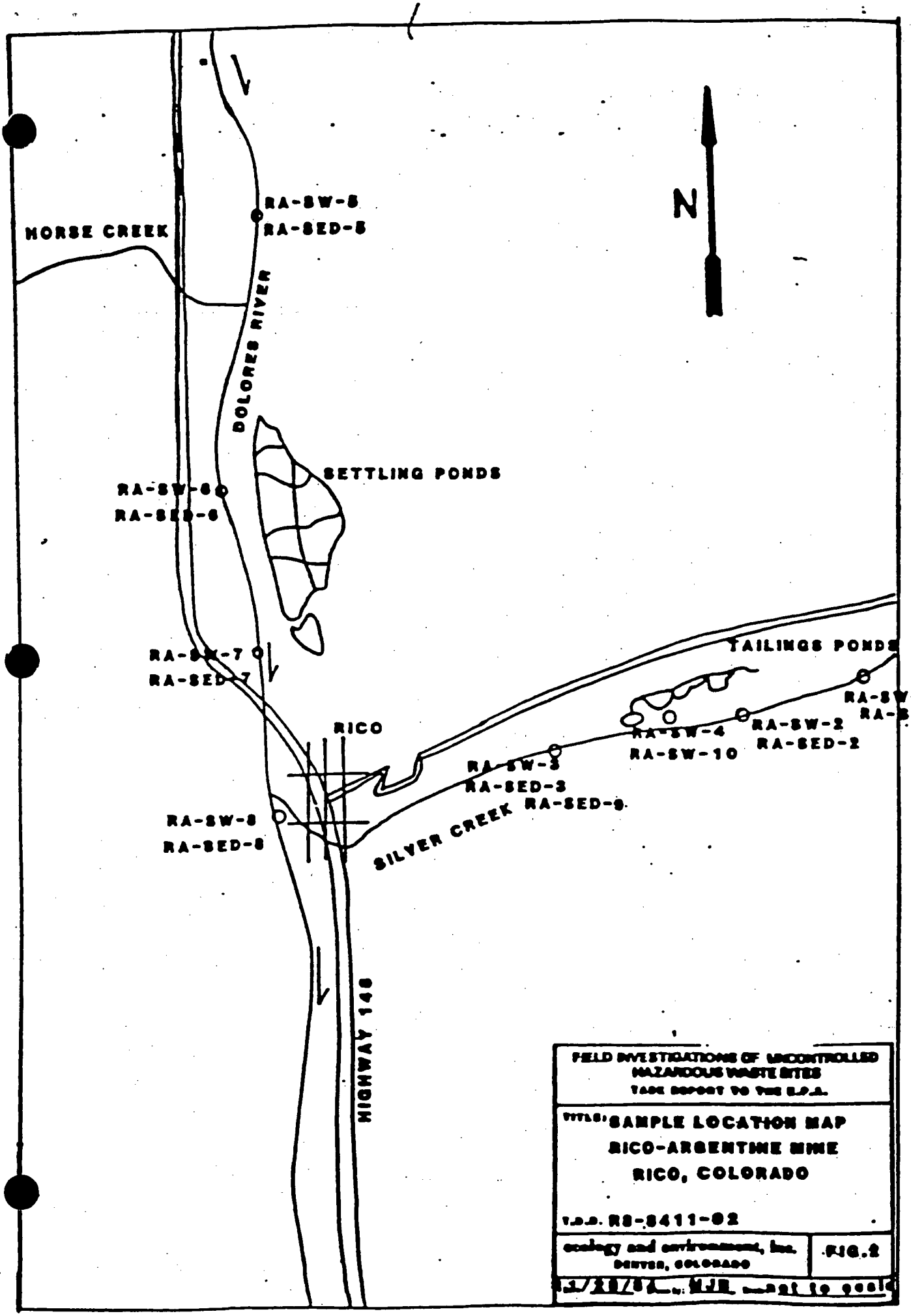
IV. INTERPRETATION OF RESULTS

Water samples from streams were compared with the drinking water standards and criteria in Table 6. The standards are legally enforceable, while criteria are recommended levels. Some elements such as calcium, magnesium and potassium do not have criteria. It is important to emphasize that these waters are apparently not used as drinking water sources. The comparison is made as a measurement of water quality degradation. In comparing drinking water standards to samples, dissolved concentrations of surface water are used. the drinking water standards are also reported in dissolved concentrations.

There were no occurences of any standards being exceeded in Silver Creek. Leachate samples RA-SW-4 and duplicate RA-SW-10 had concentrations of beryllium, iron, manganese and zinc that exceeded the criteria. Surface water sample RA-SW-3 had manganese concentrations that exceeded its criteria. RA-SW-4 and RA-SW-10 had sulfate concentrations that were 700,000 ug/l greater than the background surface water sample.

There were no occurrences of any standards being exceeded in the Dolores River. Surface water sample RA-SW-6, RA-SW-7 and RA-SW-8 all had concentrations of manganese that exceeded the criteria level.

Water samples from streams were also compared with water quality standards for the Dolores River and Silver Creek. These standards are not control regulations, but are data put out by the Colorado


N
RA-SW-5
RA-SED-5
MORSE CREEK
DOLORES RIVER
SETTLING PONDS
RA-SW-6
RA-SED-6
RA-SW-7
RA-SED-7
TAILINGS PONDS
RA-SW-
RA-SE
RICO
RA-SW-4
RA-SW-10
RA-SW-2
RA-SED-2
RA-SW-3
RA-SED-3
RA-SED-9
RA-SW-8
RA-SED-8
SILVER CREEK
HIGHWAY 145
FIELD INVESTIGATIONS OF UNCONTROLLED HAZARDOUS WASTE SITES
TASK REPORT TO THE E.P.A.
TITLE: SAMPLE LOCATION MAP
RICO-ARGENTINE MINE
RICO, COLORADO
T.D.D. R8-8411-02
ecology and environment, inc.
DENVER, COLORADO
FIG. 2

Department of Health (CDH). The CDH reports standards in total concentration. In comparing standards to samples, total concentrations of surface water are used. On Silver Creek, RA-SW-4 and duplicate RA-SW-10 which are leachate samples from tailings exceeded criteria for cadmium, copper, iron, lead, manganese, silver, zinc. There are no sulfate standards for Silver Creek. On the Dolores River, no criteria were exceeded. There are no sulfate standards for the Dolores River.

Sediment samples from Silver Creek and the Dolores River were collected form each surface water sampling location. In Silver Creek, concentrations of arsenic, cadmium, copper, iron, lead, manganese and zinc were detected in the downgradient samples (RA-SED-2, RA-SED-3, RA-SED-9) in much higher quantities than the upgradient sample (RA-SED-1). In the Dolores River, concentrations of arsenic, cadmium, copper, iron, lead, manganese and zinc were detected in the downgradient samples (RA-SED-7 and RA-SED-8) in much higher quantities than the upgradient sample (RA-SED-5).

V. CONCLUSION

The surface water data from RMA were found acceptable for use with one qualification. The holding time for cyanide was exceeded by one month. The sediment data from Radian were found acceptable for use with several qualifications. The holding time for mercury was exceeded by two months, matrix spike recoveries for six compounds were less than the acceptable limit and chromium was found in the blank.

When interpreting the surface water data from both Silver Creek and the Dolores River, it seems that the only compound of high concentration in downstream waters is manganese. The leachate from the Silver Creek tailings ponds appears to be diluted in a short distance.

The sediment data shows concentrations of metals that are clearly greater than the upstream samples. It is apparent that the metals are either precipitating from solutions or are being transported elastically. A strong coorelation can be made between metals found in downstream samples and mining operations. An extensive sediment sampling effort might be useful at this site.